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| <div>7590 09/24/2007 MCKENNA LONG & ALDRIDGE LLP Song K. Jung 1900 K Street, N.W. Washington, DC 20006</div> | | | <div>EXAMINER OLSEN, KAJ K</div> | |
| | | | <div>ART UNIT 1753</div> | <div>PAPER NUMBER</div> |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/777,767

Applicant(s)

PARK ET AL.

Examiner

Kaj K. Olsen

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 8-14 is/are rejected.
- 7) ☒ Claim(s) 6 and 7 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2-13-2004</u> | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Korea on 2/13/2003. It is noted, however, that applicant has not filed a certified copy of the Korean application as required by 35 U.S.C. 119(b).

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 9 and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
4. Claim 9 specifies that the sensing electrode is in contact with a "second metal" and an oxide of that metal. This is confusing because applicant never specified the presence of any first metal. Furthermore, according to the specification, the second metal and oxide of the second metal is part of the stabilizing material (see paragraph 0028). Claim 9 doesn't make it clear that applicant is further defining the stabilizing material of claim 1.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 2, 8, and 12-14 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 08-035947 (hereafter “JP ‘947”). For JP ‘947, the examiner is relying on a machine generated translation submitted herewith.

7. JP ‘947 discloses an electrochemical gas probe for measuring an amount of gas in a molten metal comprising a sensing unit having a reference electrode 2b, a sensing electrode 2a, a solid-state reference mixture 18, and a conductor 1 between the reference electrode and the sensing electrode. JP ‘947 further discloses a supporting unit having a main support 4, a protection cover 3 and a porous material 12 between the sensing unit and the protection cover. See fig. 1 and 2 and paragraphs 0019, 0023, and 0039. Porous material 12 of JP ‘947 functions to take up measurement gas volume in order to reduce the sensor response time (see paragraph 0016), and this would read on “stabilizing material” giving the claim language its broadest reasonable interpretation.

8. With respect to a ceramic main support, see paragraph 0020.

9. With respect to the electrolyte, see paragraph 0041.

10. With respect to the presence of a gas-tight ceramic lid, see paragraph 0039.

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11. With respect to the molten metal, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. However, see paragraph 0010.

12. With respect to the sensing unit and supporting unit being physically and electrically separable, because the sensing and supporting units are different elements that were brought together during manufacture, they must inherently be physically and electrically separable.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP '947 in view of Tiwari (USP 4,882,032).

15. JP '947 set forth all the limitations of the claim, but did not specify that the main support and protective cover are formed of the same material. Rather JP '947 only specified that main support 4 was ceramic. Takami teaches in an alternate hydrogen sensor that the main support 4 and the protection cover 20 are both formed of boron nitride. See col. 2, ll. 45-60. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to construct both the main support and protection cover of JP '947 out of the same material like taught by Takami so as to simplify the sensor construction. In addition, because both the main support and protection cover must withstand being exposed to molten metal, if one has a material

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suitable for one of the cover or main support, one would naturally be led to utilize that same material also for the other of the cover or main support. Furthermore, because a given material will have a particular coefficient of thermal expansion, utilizing the same material for both the cover and the main support ensures that both of these material will expand at the same rate.

16. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP '947 in view of Takami and Handman et al (USP 3,864,232).

17. With respect to the claim, JP '947 already disclosed that the protection cover can be constructed out of graphite (see paragraph 0017) and Takami already rendered obvious the use of the same material for both the main support and the protection cover. See the discussion above. Hence, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize graphite for the main support as well so as to garner the advantages discussed in the preceding rejection. With respect to electrically grounding the main support, Handman establishes that it is conventional to ground the probe via the molten metal, presumably because the large body of molten metal is an ideal choice of ground source. See col. 4, ll. 1-13. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the molten metal as a ground source, which would result in the main support of JP '947 being electrically grounded as well, because the molten metal would be an ideal ground source for the electrical measurement.

18. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP '947 in view of Takahashi et al (USP 4,595,485).

19. JP '947 set forth all the limitations of the claim, but didn't specify any dimension for the lead wire diameter. Takahashi teaches that a conventional diameter for a lead wire for an

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electrochemical sensor is 50 μm , which is less than 200 μm . See col. 5, ll. 40-41. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Takahashi for the probe of JP '947 to yield the predictable result of having a sensor with suitable lead wires for conducting the electrical measurement.

20. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP '947 in view of Langley et al (USP 3,567,383).

21. With respect to the claim as best understood, JP '947 set forth all the limitations but did not explicitly recite the use of a metal and an oxide of the metal in contact with the sensing electrode. Langley teaches that a metal oxide like palladium oxide is useful as a reactive metal for sensing hydrogen. See col. 2, ll. 15-18. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize a coating of palladium oxide as taught by Langley on the electrode surface of JP '947 so as to construct an electrode having high catalytic activity towards hydrogen. With respect to the presence of both a metal and a metal oxide, Langley teaches that the palladium oxide gets converted into palladium indicating that both palladium and palladium oxide would be present in hydrogen concentrations.

22. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP '947.

23. JP '947 set forth all the limitations of the claim and disclosed that a powder should be placed within the measurement volume (paragraph 0016), but did not explicitly set forth the use of carbon as that powder. However, in paragraph 0017, which immediately followed paragraph 0016, JP '947 set forth that graphite (i.e. carbon) is a suitable material for constructing the protective cap for the sensor. Given that JP '947 already recognized that carbon was a suitable material for exposure to molten metals, one possessing ordinary skill in the art would recognize

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that carbon would have also been suitable for the powder composition of the stabilizing material. Note the already present overlap between the choice of powder 12 and the choice of material for the protective cap (paragraphs 0023 and 0025).

Allowable Subject Matter

24. Claims 6 and 7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

25. Claim 10 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

26. The following is a statement of reasons for the indication of allowable subject matter: With respect to claims 6 and 7, the prior art does not disclose nor render obvious all the limitations of claim 1 where the reference mixture includes a metal, a hydride of the metal, and an oxide of the metal. Tiwari teaches the use of a combination of metal Ca and hydride CaH_2 , but the prior art does not disclose nor render obvious the addition of a metal oxide as well. With respect to claim 10, the prior art does not disclose nor render obvious all the cumulative limitations of claims 1 and 9 with the second metal being selected from the group Ti, Zr, Ca, Mn, Fe, and Ni.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (571) 272-1344. The examiner can normally be reached on Monday through Friday from 8:00 A.M. to 4:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AU 1753
September 17, 2007


KAJ K. OLSEN
PRIMARY EXAMINER